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Environmental assessment of presence of impurity materials and chemical pollutants in wood waste meant for recycling

Giorgia Faraca[1], Alessio Boldrin[1], Anders Damgaard[1] and Thomas Astrup[1]

[1]Technical University of Denmark, Bygningstorvet 2800 Kgs. Lyngby (Denmark)
E-mail contact: gfar@env.dtu.dk

In the last decades, reuse and recycling of waste have become central to European Union's environmental policy, and have been promoted as the main driving forces toward a circular economy. Among recyclable material fractions, wood waste is probably the one occurring in largest amounts, due to its many applications (constructions, buildings, furniture, packaging) and its bulky volumes. Wood waste is a valuable material as it has potential for both recycling and energy recovery. However, in a circular economy perspective, cascading of material uses should be applied, and wood incineration should be performed only when recycling is not possible. Also, high quality recycling should be preferred, and presence of impurities should therefore be minimized, if not avoided. Impurities in wood waste generally include metals, plastics, textiles, glass, inert, adhesives, paints, waxes, preservatives, fire retardants.

The objective of this study is to evaluate the environmental consequences of the presence of impurities in wood waste collected at recycling centers and meant for recyling. For the purpose, 41 samples of pre- and post-consumer wood from different applications were used. The evaluation includes the physicochemical characterization of the samples and the analysis of four different types of impurities:

- Misplacements: non wooden items.
- Unavoidable external items: non wooden items that were essential during the use phase of the wood waste.
- Material detrimental to recycling: wooden items whose properties would lower the quality of a recycled product.
- Chemical contaminants: elements present in the wood structure whose presence is due to treatment with adhesives, paints, oils, preservatives, fire retardants.

Results showed that impurities consistute a significant portion of wood waste collected for recycling. The presence of wood waste treated with hazardous preservatives such as creosote or copper-chromium arsenate was revealed and quantified. Significant differences in environmental impacts among impurities were identified. This study thereby shows that recycling alone may not lead to a clean circular economy and additional efforts are needed for an improved recyclable feedstock. Social awareness, proper sorting of the waste at collection points, preliminary treatment and sorting steps at recycling facilities are needed to enhance the quality of wood waste for its second life in a new product. This research contributes to the general discussion that a shift from quantity to quality is needed in recycling activities.